

Callista, *Lioconcha* and *Pitar* in New Caledonia and adjacent waters
(Mollusca, Veneridae)

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Key words: Mollusca, Veneridae, New Caledonia, distribution, new species

Abstract

Three species of *Callista*, seven species of *Lioconcha* including two undescribed species, *Lioconcha melharteeae* sp. nov. and *Lioconcha richerdeforgesi* sp. nov., and twelve species of *Pitar* including a previously undescribed species, *Pitar healyi* sp. nov., are recorded from material collected in the waters off New Caledonia.

Introduction

The waters of New Caledonia and surrounding areas provide within a relatively small area, a wide variety of underwater habitats comprising lagoons, reef slopes, seamounts and guyots, a sedimentary basin, trenches and volcanoes. This area is broadly defined as the New Caledonian economic zone (Richer de Forges 1990). For the past 10 years this area has been the focus of extensive sampling programmes conducted by the ORSTOM Institute, New Caledonia, aimed at documenting its diverse marine fauna. A full narrative of these cruises, including comprehensive station lists detailing latitude, longitude, depth, habitat type and collecting method, have been published elsewhere (Richer de Forges 1990, 1991) and are not repeated here. This study details the diversity and distribution of the venerid bivalves belonging to *Callista*, *Lioconcha* and *Pitar* based upon material collected on these expeditions. A small amount of material from the collection of J. Vidal has also been included. All material used in this study is housed in the Museum National d'Histoire Naturelle, Paris (MNHN). Although lacking registration numbers, the expedition material is uniquely identified by the combination of cruise name and station number.

Abbreviations used: lv, left valve; rv, right valve; pv, paired valves.

Systematics

Family Veneridae Rafinesque, 1815

Callista (*Callista*) *accincta* Römer, 1866

(Figure 1a-b)

Callista accincta Römer, 1866: 63, sp.19; pl.19, fig.1a, b.

Diagnosis: Shell moderately compressed, smooth, glossy, length to 60 mm. Sculpture of fine

concentric ridges and irregular growth pauses, ridges stronger marginally. Colour cream, orange or olive green, white umbonally, usually with two brown radial rays, white internally.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW60, 1rv; stn DW110, 1rv; stn DW137, 1rv, 1pv, 110 m; stn DW82, 1rv). Bancs Lansdowne-Fairway: (Corail 2: stn DW21, 2pv, 86 m; stn CP27, 2pv, 74–75 m; stn DW04, 3lv, 1rv; stn CP24, 2rv; stn DW01, 1rv; stn DW02, 3rv, 2lv; stn DW08, 1rv, 1lv; stn DW18, 1pv, 69 m; stn DW09, 1rv. Chalcal 1: stn D9, 1lv). Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 290, 1pv, 11 m); Ile Ouen-Baie du Prony (Lagon: stn 129, 1pv, 1rv, 44–55 m); Grand Recif Sud (Lagon: stn 294, 1pv, 21 m; stn 311, 1pv, 36 m; stn 324, 1lv, 39 m; stn 334, 1pv, 47 m; stn 344, 1pv, 37 m; stn 383, 1rv, 62 m. Lagon: stn 545, 1pv, 37 m; stn 548, 1pv, 32 m; stn 555, 1pv, 55 m; stn 559, 1pv, 52 m; stn 560, 1pv, 48 m; stn 574, 1rv); Atoll de Huon (Lagon: stn 433, 1rv); Secteur de Yate (Lagon: stn 620, 1pv, 1rv, 50–52 m; stn 624, 1pv, 46–44 m; stn 641, 1rv); Secteur de Canala (Lagon: stn 696, 1rv; stn 697, 1pv, 1rv, 1lv, 57–41 m; stn 702, 1rv; stn 708, 1rv, 1lv; stn 724, 1rv; stn 725, 1pv, 2lv, 43 m; stn 729, 1pv, 42–45 m; stn 753, 1lv); Secteur de Thio (Lagon: stn 680, 1pv, 1rv, 33 m; stn 693, 2pv, 35–38 m); Secteur de Poindimie (Lagon: stn 762, 1pv, 1lv, 43 m; stn 763, 1pv, 1lv, 42 m; stn 772, 3pv, 1lv, 30 m; stn 780, 1pv, 33 m; stn 800, 6pv, 33 m; stn 801, 2rv; stn 808, 1pv, 30 m); Grand Recif Mengalia (Lagon: stn 855, 1lv; stn 867, 1rv); Secteur de Poum (Lagon: stn 1026, 3pv, 29 m); Secteur de Belep (Lagon: stn 1154, 2lv, 1rv; stn 1156, 2rv, 2lv; stn 1157, 1pv, 3rv, 4lv, 55 m; stn 1159, 1rv, 1lv; stn 1063, 6lv, 1rv).

Remarks: The holotype of *Callista accincta* cannot be traced and the assignment of material to *C. accincta* is based on Römer's excellent illustrations. Most of the Römer types were contained in the Dohrn collection which was housed in the Stettin Museum. This institution was totally destroyed during World War II (Dance 1986: 210).

Callista (Callista) roseotincta (Smith, 1885)

(Figure 1c–d)

Cytherea roseotincta Smith, 1885: 136, pl.1, fig.6a, b.

Callista (Striacallista) roseotincta (Smith); Lamprell and Whitehead, 1992: sp.535.

Diagnosis: Shell thin, smooth, glossy, length to 23 mm. Colour white, blotched and radially rayed with fawn or pink; interior white, sometimes with the external pink rays visible internally.

Material examined: Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 8, 2pv, 15 m); Ile Ouen-Baie du Prony (Lagon: stn 64, 1pv, 15 m; stn 66, 3pv, 15 m; stn 80, 1pv, 33 m; stn 83, 1pv, 22 m; stn 120, 1pv, 46 m. Lagon: stn 226, 20pv, 22 m; stn 239, 1pv, 43 m); Baie de St Vincent (Lagon: stn 170, 2pv, 22 m); Grand Recif Sud (Lagon: stn 293, 6pv, 20 m; stn 296, 1pv, 26 m; stn 304, 1pv, 27 m; stn 308, 2pv, 18 m; stn 311, 1pv, 1lv, 36 m; stn 312, 1pv, 26 m; stn 313, 1pv, 30 m; stn 324, 2pv, 1rv, 2lv, 39 m; stn 334, 1pv, 2rv, 2lv, 47 m; stn 339, 1pv, 26 m; stn 340, 3pv, 1lv, 27 m; stn 344, 1pv, 37 m; stn 345, 1pv, 39 m; stn 367, 1pv, 105 m; stn 377, 1rv; stn 386, 2lv, 1rv; stn 405, 1pv, 27 m; stn 544, 2pv, 1lv, 25 m; stn 547, 4pv, 29 m; stn 548, 2pv, 33 m); Ile de Pins (Lagon: stn 581, 3pv; stn 589, 2pv, 1rv, 1lv, 31 m; stn 590, 1pv, 20 m; stn 591, 2pv, 16 m; stn 596, 2pv, 35 m); Atoll de Surprise (Lagon: stn 473, 1pv, 50 m); Secteur de Yate (Lagon: stn 632, 4pv, 2rv, 45 m; stn 644, 1pv, 48–45 m); Secteur de Thio (Lagon: stn 675, 1pv, 43 m; stn 680, 1pv, 33 m; stn 681, 1pv, 33 m; stn 682, 5pv, 37 m); Secteur de Canala (Lagon: stn 696, 1pv, 57–41 m; stn 701, 1pv, 39 m; stn 702, 3pv, 37 m; stn 703, 2pv, 40 m; stn 707, 1pv, 38 m; stn 725, 2pv, 1rv, 43 m; stn 730, 6pv, 43 m; stn 731, 1pv, 42 m; stn 754, 1pv, 36 m); Secteur de Poindimie (Lagon: stn 771, 1pv, 34 m; stn 772, 1pv, 30 m; stn 780, 1pv, 33 m; stn 781, 2pv, 36 m); Grand Recif Mengalia (Lagon: stn 867, 1rv); Secteur de Pouebo (Lagon: stn 892, 1pv, 26 m; stn 894, 1rv); Secteur de Poum (Lagon: stn 984, 1pv, 23 m; stn 991, 1pv; stn 995, 1rv; stn 1015, 2pv, 25 m; stn 1016, 1pv, 20 m; stn 1025, 2 pv, 28 m); Secteur de Balabio (Lagon: stn 1046, 1pv, 7 m); Secteur des Belep (Lagon: stn 1157, 1rv; stn 1168, 1lv, 1rv).

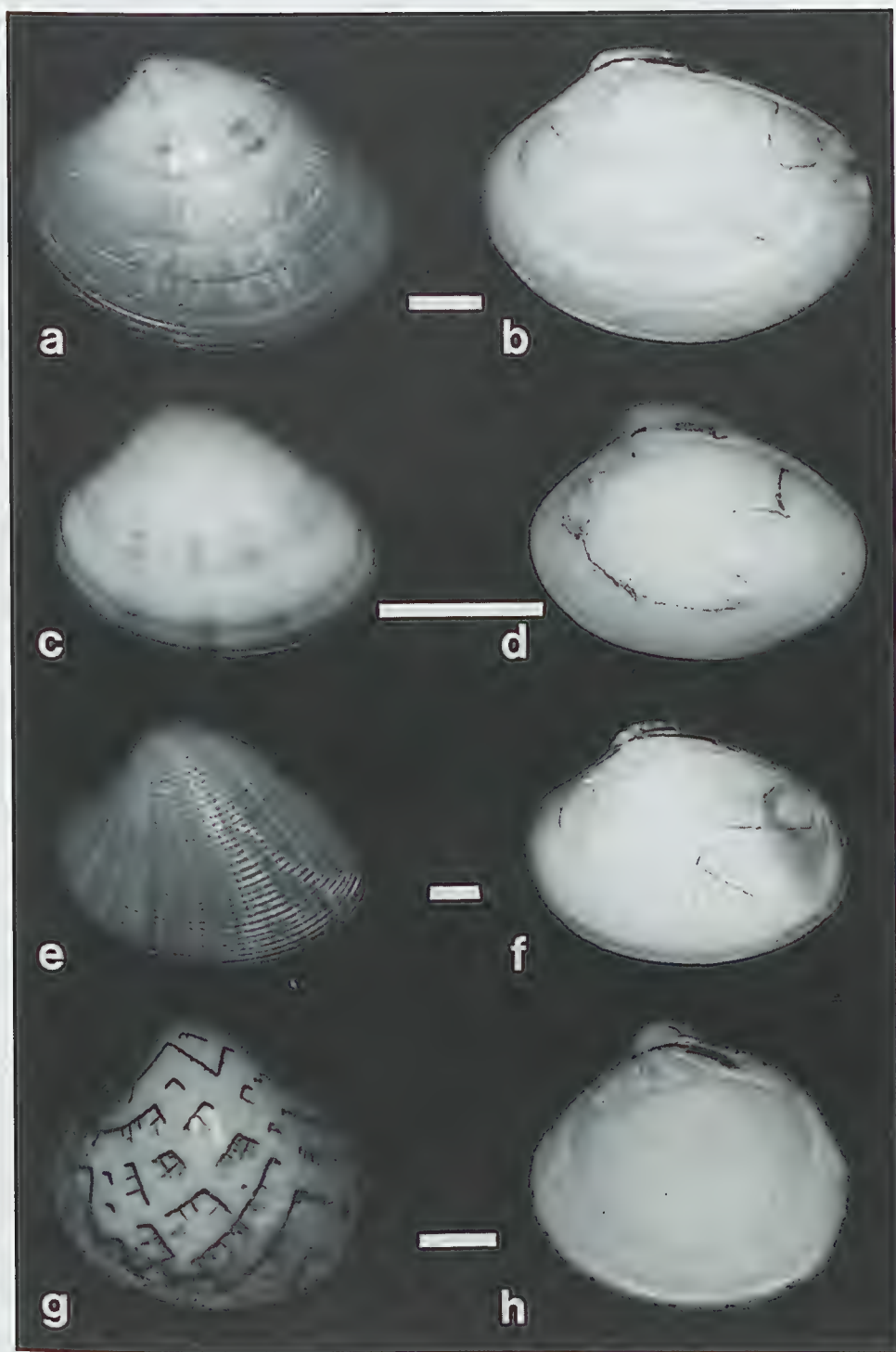


Figure 1. a-b. *Callista (Callista) accincta* Römer, Corail 2: stn DW21; c-d. *Callista (C.) roseotincta* (Smith), Lagon: stn 226; e-f. *Callista (Costacallista) lilacina* (Lamarck), Lagon: stn 1024; g-h. *Lioconcha (Lioconcha) castrensis* (Linnaeus), Musorstom: stn DW431. Scale bars equal 10 mm.

Ride des Loyaute: (SMIB 5: stn DW81, 2rv, 1lv; stn DW92, 1pv, 110 m).

Remarks: Smith (1885) described *C. roseotincta* from one right valve in which the anterior cardinal tooth was missing. A description of the teeth from an intact specimen is as follows:—left valve anterior lateral strong, peg-like; anterior cardinal thin, almost wafer-like, slightly concave joined at apex to posterior cardinal, separated from it by a deep socket; posterior cardinal thick at base, slightly concave; posterior lateral thin, moderately short, parallel to escutcheon; right valve anterior lateral pit deep; anterior cardinal strong, thin edged, separated by a deep slit from the posterior cardinal; posterior cardinal thick with deep pit separating it from the posterior lateral; posterior lateral thick. In addition Smith (1885), referred to 2 internal broad radial rose-pink rays towards the upper part of the valve. However, many of the specimens examined were white internally.

Callista (Costacallista) lilacina (Lamarck, 1818)

(Figure 1e–f)

Cytherea lilacina Lamarck, 1818: 302, fig.15.

Cytherea pectoralis Sowerby, 1853: 625, pl.130, fig.75; non Lamarck, 1818.

Dione grata Deshayes, 1853: 62.

Callista (Costacallista) lilacina (Lamarck); Lamprell and Whitehead 1992: sp.537.

Diagnosis: Shell solid, length to 75 mm. Sculpture of close-set, narrow, concentric ridges. Colour brown, with slightly darker brown radial rays, purple-brown at the margins posteriorly and the lunule; interior white, centrally and at hinge, with purple margins.

Material examined: Nouvelle-Caledonie: Secteur de Pouebo (Lagon: stn 895, 5pv, 16 m; stn 901, 1pv, 1rv, 22–40 m; stn 903, 1rv); Secteur de Koumac (Lagon: stn 931, 1pv, 21 m); Secteur de Poum (Lagon: stn 1024, 1pv, 1rv, 1lv, 26 m; stn 1029, 1lv); Secteur de Balabio (Lagon: stn 1056, 1pv, 22 m); Secteur des Belep (Lagon: stn 1069, 1pv, 2rv, 1lv, 30 m; stn 1095, 1rv; stn 1117, 2pv, 36 m; stn 1129, 4pv, 40 m).

Remarks: These New Caledonian records of *C. lilacina* are from the northern limit of the species' Indo-Pacific range. The absence of this species from the Chesterfield Plateau is surprising.

Lioconcha (Lioconcha) castrensis (Linnaeus, 1758)

(Figure 1g–h)

Venus castrensis Linnaeus, 1758: 1132.

Cytherea ornata Lamarck, 1818: 309; non Dillwyn, 1817.

Lioconcha (Lioconcha) castrensis (Linnaeus); Lamprell and Whitehead 1992: sp.543.

Diagnosis: Shell solid; length to 50 mm. Colour variable, usually white, with chevron patterns varying from blue-black to tan; some Great Barrier Reef shells have hieroglyphic patterns; interior white or pale orange.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW46, 4pv, 1lv, 21 m; stn DW50, 1lv; stn DW51, 1pv, 69 m; stn DW69, 1pv, 30–52 m; stn DW87, 1rv, 1lv; stn DW97, 1lv; stn DW136, 1pv, 1rv, 37 m; stn DW138, 1rv, 1lv; stn DW148, 1pv, 1rv, 148 m). Bancs Lansdowne-Fairway: (Corail 2: stn DW10, 1lv. Chalcal 1: stn D7, 2lv; stn D24, 1rv; stn D62, 1rv). Plateau Chesterfield-Bellona (Chalcal 1: stn CP16, 1lv; stn 39, 1pv, 4lv, 3rv, 63 m; stn D55, 1pv, 23 m; stn D61, 1lv). Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 34, 1rv. Lagon: stn 284, 1lv); Ile Ouen-Baie du

Prony (Lagon: stn 98, 2pv, 39 m); Baie de St Vincent (Lagon: stn 214, 1pv, 12 m; stn 218, 1rv); Grand Recif Sud (Lagon: stn 293, 6pv, 20 m; stn 305, 1pv, 11v, 26 m; stn 308, 1pv, 18 m; stn 312, 2pv, 26 m; stn 340, 4pv, 27 m; stn 344, 3pv, 37 m; stn 544, 1pv, 11v, 25 m; stn 546, 1pv, 33 m); Atoll de Surprise (Lagon: stn 461, 1pv, 35 m; stn 466, 1pv, 42 m; stn 473, 1pv, 50 m); Lagon Nord (Lagon: stn 480, 1pv, 1rv, 31 m; stn 487, 3pv, 37 m; stn 489, 11v; stn 521, 1pv, 39 m); Ile de Pins (Lagon: stn 589, 3pv, 31 m; stn 594, 1pv, 27 m); Secteur de Thio (Lagon: stn 677, 1pv, 32 m); Grand Recif Mengalia (Lagon: stn 853, 1pv, 27 m; stn 866, 1pv, 26 m); Secteur de Koumac (Lagon: stn 917, 1pv, 27 m); Secteur de Poum (Lagon: stn 1006, 1pv, 25 m; stn 1016, 1pv, 20 m); Secteur des Belep (Lagon: stn 1145, 1rv; stn 1159, 2pv, 50 m; stn 1182, 11v; stn 1189, 1rv). Ride des Loyaute: (Musorstom 6: stn DW431, 1pv, 21-m).

Remarks: *Lioconcha castrensis* is very variable in size, shape and colour and can easily be confused with *L. ornata*, *L. annettae* and *L. fastigiata* which have a similar tented, colour pattern. However, compared with these species *L. castrensis* is larger in size and has a more ovate shape.

Lioconcha (Lioconcha) polita (Röding, 1798)

(Figure 2a–b)

Venus polita Röding, 1798: 181.

Cytherea sulcatina Lamarck, 1818: 568.

Lioconcha (Lioconcha) polita (Röding); Lamprell and Whitehead, 1992: sp.547.

Diagnosis: Shell solid, inflated, length to 30 mm. Colour dark brown or orange with concentric chevron or zigzagging patterns and rays; interior white, dark red-purple posteriorly, often ventrally; usually yellow centrally.

Material examined: Plateau Chesterfield-Bellona: (Chalcal 1: stn D44, 5pv, 38 m). Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn CP1, 1pv, 70 m; stn 11, 4pv, 24 m; stn 33, 1rv; stn 43, 1pv, 25 m; stn 54, 1pv, 25 m; stn 55, 2pv, 23 m; stn 58, 8pv, 22 m; stn 263, 1pv, 23 m; stn 264, 2pv, 19 m; stn 268, 1pv, 24 m; stn 271, 1pv, 22 m; stn 274, 3pv, 12 m; stn 280, 1pv, 24 m; stn 286, 1pv, 28 m); Ile Ouen-Baie du Prony (Lagon: stn 85, 1pv, 21 m; stn 104, 2pv, 24 m; stn 157, 1pv, 15 m); Baie de St Vincent (Lagon: stn 165, 1pv, 21 m; stn 166, 1pv, 10 m; stn 167, 2pv, 11 m; stn 168, 5pv, 10 m; stn 179, 1pv, 12 m; stn 181, 1pv, 10 m; stn 197, 3pv, 6 m; stn 198, 1pv, 14 m; stn 203, 5pv, 1rv, 11v, 13 m; stn 205, 1rv, 11v; stn 209, 2pv, 1rv, 14 m; stn 211, 1pv, 12 m; stn 215, 2pv, 14 m; stn 216, 3pv, 1rv, 11v, 14 m); Grand Recif Sud (Lagon: stn 404, 11v; stn 405, 3pv, 1rv, 27 m; stn 406, 11v); Atoll de Huon (Lagon: stn 438, 1pv, 37 m; stn 439, 84pv, 39 m); Atoll de Surprise (Lagon: stn 447, 3pv, 1rv, 36 m; stn 448, 1pv, 30 m; stn 451, 1rv; stn 455, 1pv, 40 m; stn 456, 2pv, 1rv, 37 m; stn 466, 3pv, 1rv, 42 m; stn 469, 2pv, 2rv, 11v, 39 m; stn 471, 2pv, 42 m); Ile de Pins (Lagon: stn 596, 2pv, 35 m; stn 581, 2pv, 23 m; stn 595, 2pv, 1rv, 37 m; stn 590, 1rv); Secteur de Pouebo (Lagon: stn 892, 1pv, 26 m; stn 895, 1pv, 16 m); Secteur de Koumac (Lagon: stn 905, 1pv, 57 m; stn 932, 5pv, 1rv, 23 m; stn 944, 1pv, 15 m; stn 945, 1pv, 16 m; stn 950, 3pv, 13 m; stn 953, 2pv, 1rv, 19 m; stn 956, 1pv, 17 m); Secteur de Poum (Lagon: stn 962, 6pv, 26 m; stn 971, 6pv, 1rv, 26 m; stn 973, 1pv, 27 m; stn 989, 3pv, 21 m; stn 990, 1pv, 23 m; stn 996, 11v; stn 998, 1rv; stn 999, 1pv, 22 m; stn 1004, 3pv, 15 m; stn 1005, 5pv, 17 m; stn 1008, 1pv, 27 m; stn 1009, 2pv, 20 m; stn 1010, 2pv, 16 m; stn 1012, 3pv, 15 m; stn 1011, 3pv, 14 m; stn 1013, 1pv, 18 m; stn 1018, 1pv, 21 m; stn 1025, 1pv, 28 m; stn 1035, 2pv, 15 m; stn 1037, 2pv, 25 m); Secteur de Balabio (Lagon: stn 1039, 2pv, 21 m; stn 1056, 2pv, 1rv, 22 m); Secteur des Belep (Lagon: stn 1065, 3rv, 2lv; stn 1067, 6rv, 2lv; stn 1069, 6pv, 30 m; stn 1070, 1pv, 2lv, 29 m; stn 1071, 1pv, 1rv, 26 m; stn 1073, 3lv, 3rv; stn 1075, 2lv; stn 1076, 11rv, 6lv; stn 1077, 2rv; stn 1078, 11v; stn 1079, 5lv, 1rv; stn 1080, 2pv, 11v, 1rv, 34 m; stn 1081, 6lv, 2rv, ; stn 1082, 5lv, 3rv; stn 1083; 2rv, 11v; stn 1084, 3rv, 4lv; stn 1085, 4lv, 3rv; stn 1086, 4pv, 5lv, 6rv, 31 m; stn 1087, 3rv, 2lv; stn 1089, 4pv, 4rv, 3lv, 35 m; stn 1091,

1rv, 1lv; stn 1092, 2rv, 1lv; stn 1093, 1lv; stn 1095, 2pv, 29 m; stn 1097, 2rv; stn 1110, 2pv, 31 m; stn 1101, 1pv, 1lv, 38 m; stn 1102, 3pv, 38 m; stn 1103, 1pv, 5lv, 5rv, 32 m; stn 1106, 4pv, 39 m; stn 1108, 1pv, 40 m; stn 1109, 2pv, 2lv, 38 m; stn 1112, 4pv, 42 m; stn 1114, 1rv; stn 1115, 1pv, 42 m; stn 1121, 1rv; stn 1128, 1pv, 26 m; stn 1188, 1pv, 33 m; stn 1209, 2pv, 21 m; stn 1211, 1rv; stn 1212, 1pv, 22 m; stn 1214, 7pv, 1lv, 1rv, 29 m; stn 1216, 1pv, 30 m; stn 1217, 1rv).

Remarks: *Lioconcha polita* is well represented in the offshore waters of New Caledonia but like *Callista roseotincta* is, with a single exception, absent from the Chesterfield Plateau.

Lioconcha (Lioconcha) annettae Lamprell and Whitehead, 1990

(Figure 2c–d)

Lioconcha annettae Lamprell and Whitehead, 1990: 49, fig.4e–h; Lamprell and Whitehead, 1992: sp.545.

Diagnosis: Shell with umbones inflated, similar to *L. ornata* in shape, length to 38 mm. Colour white, with black, chestnut-red or dark-brown chevron or hieroglyphic patterns; interior white, yellow centrally.

Material examined: Plateau des Chesterfield (Corail 2: stn DW41, 1rv; stn DW46, 1rv; stn DW50, 4pv, 1lv, 2rv, 49 m; stn DW51, 2lv; stn DW60, 2lv, 1rv; stn DW61, 1rv; stn DW73, 1pv, 1lv, 240 m; stn DW82, 1lv; stn DW87, 6lv, 3pv, 31 m; stn DW126, 1lv, 1rv; stn DW128, 1pv, 3lv, 3rv, 38 m; stn DW147, 4pv, 25 m). Nouvelle-Caledonie: Baie de St Vincent (Lagon: stn 214, 1pv, 1lv, 12 m); Ile Ouen-Baie du Prony (Lagon: stn 225, 1pv, 15 m); Secteur de Noumea (Lagon: stn 275, 1pv, 19 m); Grand Recif Sud (Lagon: stn 305, 2pv, 26 m; stn 341, 1pv, 19 m); Ile de Pins (Lagon: stn 590, 3pv, 20 m; stn 593, 3pv, 25 m); Grand Recif Mengalia (Lagon: stn 855, 2pv, 22 m); Secteur de Pouebo (Lagon: stn 888, 1lv). Ride des Loyaute: (Musorstom 6: stn DW432, 1pv, 1lv, 21 m; stn DW435, 2rv).

Remarks: *Lioconcha annettae* is more attenuate posteriorly than *L. ornata*. Internally *L. annettae* has a sub-umbonal, orange-yellow colour patch, whereas *L. ornata* has a central, yellow colour patch. A comprehensive study of the *annettae* – *ornata* complex may yet show these forms to be conspecific.

Lioconcha (Lioconcha) ornata (Dillwyn, 1817)

(Figure 2e–f)

Venus ornata Dillwyn, 1817: 184.

Cytherea picta Lamarck, 1818: 309.

Lioconcha (Lioconcha) ornata (Dillwyn); Lamprell and Whitehead, 1992: sp.544.

Diagnosis: Shell solid, umbones inflated, length to 50 mm. Colour usually cream, mostly with fine, dense, brown or black reticulate, chevron patterns and fine dots; interior white, yellow-orange centrally.

Material examined: Plateau des Chesterfield (Corail 2: stn DW31, 1pv, 10lv, 15rv, 57 m; stn DW32, 1pv, 11lv, 1rv, 55 m; stn DW33, 1pv, 52 m; stn DW34, 1pv, 47 m; stn DW38, 4pv, 61 m; stn DW40, 1pv, 2rv, 58 m; stn DW41, 4lv, 2rv; stn DW42, 4pv, 7lv, 7rv, 45 m; stn DW44, 2lv, 2rv; stn DW48, 4pv, 1lv, 44 m; stn DW50, 1pv, 49 m; stn DW51, 2pv, 69 m; stn DW59, 1pv, 1lv, 50 m; stn DW60, 1pv, 4lv, 4rv, 45 m; stn DW65, 2pv, 1rv, 62 m; stn DW67, 1rv; stn DW70, 1pv, 1rv, 54 m; stn DW72, 7pv, 2rv, 3lv, 32 m; stn DW76, 1pv, 2rv, 3lv, 53 m; stn DW77, 1lv, 1rv; stn DW80, 1rv; stn DW84, 1rv; stn DW85, 1rv; stn DW87, 1rv, 3pv, 31 m; stn DW88, 1pv, 20lv, 17rv, 32 m; stn

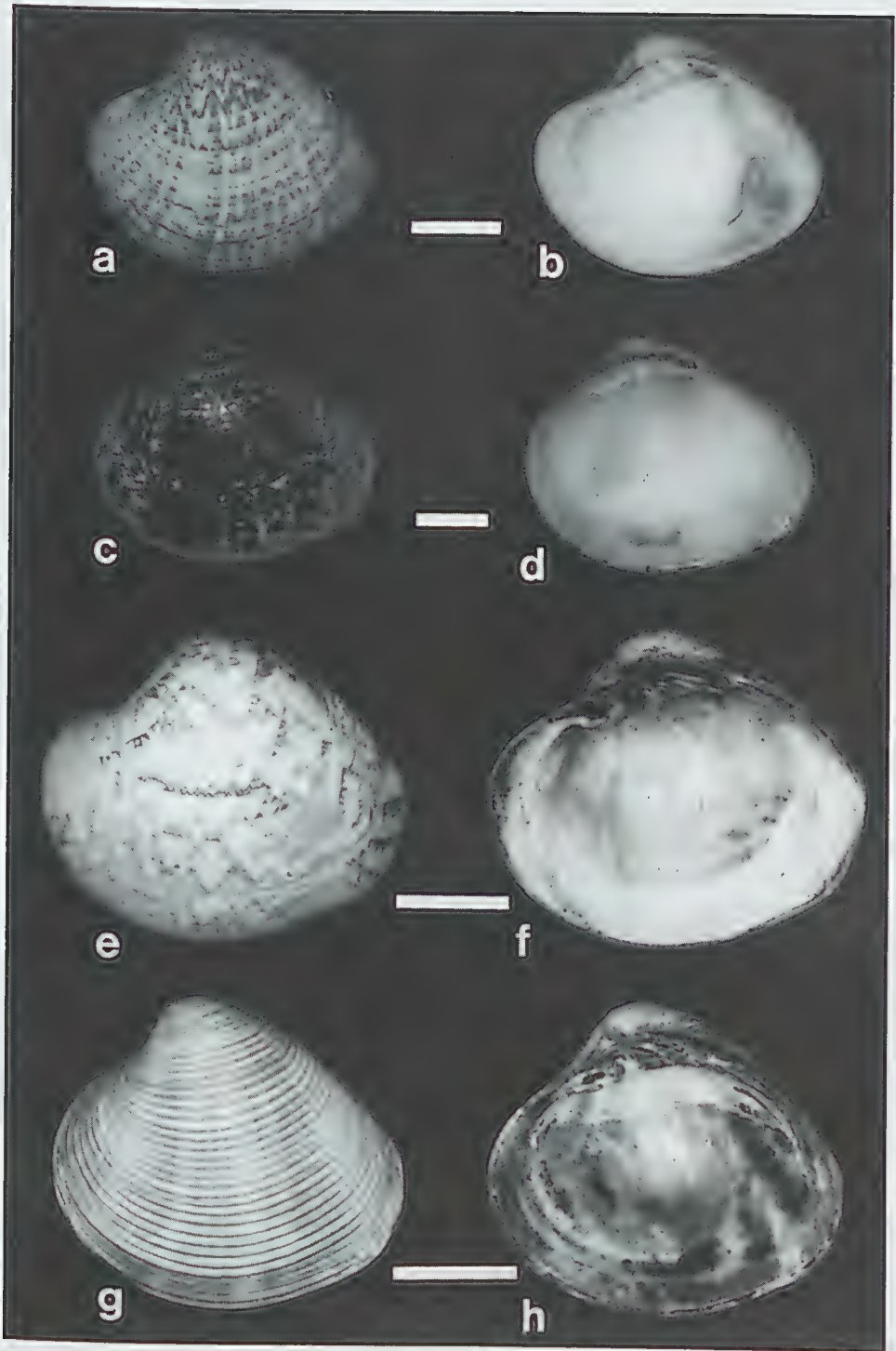


Figure 2. a-b. *Lioconcha (Lioconcha) polita* (Röding), Lagon: stn 1081; c-d. *Lioconcha (L.) annettae* Lamprell and Whitehead, Lagon: stn 275; e-f. *Lioconcha (L.) ornata* (Dillwyn), Lagon: stn 800; g-h. *Lioconcha (Sulcilioconcha) philippinarum* (Hanley), Lagon: stn 839. Scale bars equal 10 mm.

DW91, 3pv, 43 m; stn DW94, 3pv, 2rv, 36–53 m; stn DW96, 3pv, 1rv, 41 m; stn DW100, 1pv, 40 m; stn DW102, 1pv, 58 m; stn DW103, 1rv, 1lv; stn DW104, 1pv, 49 m; stn DW106, 1pv, 1lv, 62 m; stn DW110, 3pv, 2rv, 4lv, 40 m; stn DW116, 1rv; stn DW117, 1pv, 20 m; stn DW118, 2lv; stn DW121, 1pv, 3rv, 2lv, 12 m; stn DW122, 3pv, 1lv, 28 m; stn DW126, 2pv, 1lv, 19 m; stn DW128, 2rv; stn DW133, many; stn DW137, 2pv, 1lv, 37 m; stn DW138, 1rv; stn DW143, 1pv, 1rv, 32 m; stn DW145, 4pv, 1rv, 2lv, 15–30 m; stn DW146, 1lv, 1pv, 40–52 m; stn DW153, 1lv, 1rv; stn DW154, 1pv, 29 m; stn DW154, 2rv; stn DW155, 1pv, 1rv, 23 m; stn DW156, 2pv, 21 m; stn DW160, 1lv, 1rv; stn DW163, 1rv, 1lv; stn DW166, 1pv, 1rv, 10 m). Plateau Chesterfield-Bellona: (Chalcal 1: stn D17, 1pv, 8lv, 7rv, 44 m; stn D18, 2rv; stn D24, 1pv, 38 m; stn D26, 1pv, 1rv, 1lv, 48 m; stn D28, 2lv; stn D39, 2pv, 40 m; stn D42, 1lv; stn D45, 4pv, 1rv, 50 m; stn D47, 1pv, 70 m; stn D49, 1pv, 48 m; stn D54, 1pv, 36–42 m; stn D56, 1pv, 60 m; stn D60, 1pv, 3lv, 1rv, 45 m; stn D61, 1pv, 1lv, 50 m). Bancs Lansdowne-Fairway (Corail 2: stn DW18, 1pv, 1lv, 69 m; stn CP24, 1pv, 74–75 m). Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 1, 5pv, 19 m; stn 4, 5pv, 9 m; stn 8, 1pv, 15 m; stn 21, 2pv, 10 m; stn 22, 1lv; stn 27, 5pv, 2rv, 2lv, 18 m; stn 30, 1pv, 24 m; stn 41, 1pv, 28–46 m; stn 45, 1pv, 14 m; stn 49, 2pv, 10 m; stn 50, 4pv, 12 m; stn 51, 2pv, 10 m; stn 251, 3pv, 20 m; stn 257, 1pv, 9 m; stn 265, 1rv; stn 268, 1lv; stn 270, 3pv, 1lv, 25 m; stn 271, 2pv, 22 m; stn 272, 2pv, 22 m; stn 273, 1pv, 9 m; stn 274, 3pv, 12 m; stn 276, 3pv, 26 m; stn 277, 1pv, 30 m; stn 287, 2pv, 29 m; stn 289, 1pv, 23 m); Ile Ouen-Baie du Prony (Lagon: stn 64, 1pv, 15 m; stn 65, 5pv, 24 m; stn 66, 1pv, 15 m; stn 73, 2pv, 15 m; stn 77, 1pv, 22 m; stn 79, 1pv, 16 m; stn 80, 1pv, 33 m; stn 82, 5pv, 10 m; stn 83, 1pv, 22 m; stn 84, 3pv, 17 m; stn 89, 1pv, 32 m; stn 90, 1pv, 32 m; stn 93, 4pv, 17 m; stn 94, 3pv, 17 m; stn 95, 5pv, 14 m; stn 98, 4pv, 15 m; stn 99, 1pv, 14 m; stn 161, 1pv, 1rv, 20 m; stn 224, 2pv, 30 m; stn 226, 9pv, 28 m; stn 229, 1pv, 41 m; stn 233, 6pv, 30 m); Baie de St Vincent (Lagon: stn 162, 2pv, 1rv, 10 m; stn 163, 1pv, 15 m; stn 168, 1pv, 10 m; stn 170, 1pv, 22 m; stn 173, 1pv, 20–50 m; stn 178, 2pv, 20 m; stn 180, 3pv, 10 m; stn 182, 1pv, 8 m; stn 186, 1pv, 1lv, 1rv, 11 m; stn 200, 1pv, 18 m; stn 201, 1pv; stn 206, 1pv; stn 214, 1pv, 1lv, 12 m; stn 217, 2pv, 1rv, 16 m; Grand Recif Sud (Lagon: stn 293, 7pv, 1rv, 20 m; stn 294, 1pv, 21 m; stn 296, 2pv, 26 m; stn 298, 1pv, 37 m; stn 299, 1pv, 35 m; stn 306, 1lv; stn 311, 3pv, 36 m; stn 312, 2pv, 26 m; stn 313, 2pv, 30 m; stn 316, 1pv, 68 m; stn 336, 1pv, 26 m; stn 340, 8pv, 1rv, 27 m; stn 341, 4pv, 3rv, 19 m; stn 344, 4pv, 37 m; stn 349, 1pv, 55 m; stn 357, 1pv, 77 m; stn 363, 1lv; stn 364, 1pv, 1rv, 49 m; stn 368, 1rv; stn 411, 1lv; stn 428, 1rv; stn 544, 1pv, 25 m; stn 545, 3pv, 37 m; stn 546, 2pv, 33 m; stn 547, 17pv, 1lv, 1rv, 29 m; stn 549, 2pv, 27 m; stn 550, 1pv, 26 m; stn 552, 1pv, 39 m; stn 554, 3pv, 25–29 m; stn 559, 1pv, 53 m; stn 572, 1pv, 67 m); Atoll de Huon (Lagon: stn 436, 1lv; stn 443, 1pv, 40 m); Atoll de Surprise (Lagon: stn 449, 1pv, 21 m; stn 455, 1pv, 40 m; stn 458, 1pv, 40 m; stn 465, 1pv, 1rv, 1lv, 45 m); Lagon Nord (Lagon: stn 478, 4pv, 35 m; stn 481, 5pv, 1rv, 1lv, 33 m; stn 482, 1pv, 33 m; stn 489, 1pv, 40–43 m; stn 504, 1lv; stn 520, 1pv, 37 m; stn 536, 1lv; stn 541, 1rv; stn 542, 2pv, 50 m; stn 542, 1lv); Ile de Pins (Lagon: stn 589, 2pv, 1lv, 1rv, 31 m; stn 591, 1pv, 16 m; stn 593, 1pv, 26 m; stn 594, 1pv, 27 m); Secteur de Yate (Lagon: stn 607, 1rv; stn 632, 1pv, 45 m; stn 634, 1pv, 36–42 m); Secteur de Thio (Lagon: stn 672, 1pv, 15–20 m; stn 687, 1pv, 40 m; stn 894, 1pv, 12 m); Secteur de Canala (Lagon: stn 696, 1pv, 57–41; stn 710, 1pv, 31 m; stn 715, 1pv, 35 m; stn 731, 2pv, 42 m; stn 749, 1rv, 1lv; stn 754, 1pv, 1rv, 36 m; stn 757, 1pv, 1rv, 44 m; stn 759, 1rv); Secteur de Poindimie (Lagon: stn 772, 1pv, 1lv, 30 m; stn 787, 1lv; stn 795, 1pv, 31 m; stn 800, 1pv, 33 m; stn 801, 1rv; stn 807, 1rv; stn 855, 2pv, 22 m; stn 855, 1pv, 22 m); Grand Recif Mengalia (Lagon: stn 851, 1lv; stn 859, 1lv; stn 865, 1pv, 24 m; stn 866, 1pv, 1rv, 26 m; stn 873, 1pv, 27 m; stn 864, 1pv, 1rv, 26 m; stn 870, 1pv, 37 m); Secteur de Pouebo (Lagon: stn 881, 1pv, 27 m; stn 885, 2pv, 32 m; stn 886, 1lv; stn 890, 2pv, 23 m; stn 891, 3pv, 1lv, 25 m; stn 898, 1pv, 22 m); Secteur de Koumac (Lagon: stn 905, 1pv, 57 m; stn 910, 5pv, 26 m; stn 912, 2rv; stn 913, 2pv, 13 m; stn 915, 1lv; stn 916, 1pv, 13 m; stn 923, 1rv; stn 924, 1pv, 15 m; stn 936, 1pv, 15 m; stn 938, 1rv; stn 939, 6pv, 12 m; stn 940, 1pv, 1lv, 10 m; stn 942, 1pv, 15 m; stn 943, 2pv, 15 m; stn 946, 1pv, 17 m; stn 947, 2pv, 18 m; stn 951, 4pv, 1lv, 1rv, 12 m; stn 954, 1rv; stn 957, 1pv, 18 m); Secteur de Poum (Lagon: stn 961, 2pv, 20 m; stn 975, 2pv, 24 m; stn 976, 1pv, 1lv, 1rv, 20 m; stn 978, 1pv, 19 m; stn 980, 2lv, 1rv; stn 983, 1pv, 1lv, 68 m; stn 984, 8pv, 23 m; stn 985, 1pv, 17 m; stn 986, 1pv, 18 m; stn 990, 1pv, 23 m; stn 991, 1pv, 28 m; stn 995, 1pv, 36 m; stn

997, 1pv, 2rv, 1lv, 23 m; stn 1001, 1pv, 89 m; stn 1006, 2pv, 25 m; stn 1010, 1pv, 16 m; stn 1015, 1pv, 25 m; stn 1017, 2pv, 1lv, 21 m; stn 1002, 3pv, 78 m; stn 1007, 2pv, 24 m; stn 1025, 6pv, 28 m; Secteur de Balabio (Lagon: stn 1045, 1pv, 12 m); Secteur des Belep (Lagon: stn 1063, 3pv, 4rv, 2lv, 31 m; stn 1104, 1pv, 4lv, 1rv, 22 m; stn 1105, 3pv, 3rv, 6lv, 25 m; stn 1118, 1pv, 2rv, 3lv, 30 m; stn 1126, 2lv, 2rv, 41 m; stn 1134, 1pv, 40 m; stn 1139, 1pv, 39 m; stn 1140, 1lv; stn 1145, 13pv, 5rv, 4lv, 38 m; stn 1154, 3rv, 5lv, 40 m; stn 1156, 5rv, 3lv, 55 m; stn 1157, 1pv, 3lv, 2rv, 48 m; stn 1158, 1pv, 9rv, 2lv, 48 m; stn 1168, 3pv, 6lv, 4rv, 50 m; stn 1169, 1pv, 47 m; stn 1169, 2rv, 47 m; stn 1174, 1lv; stn 1181, 3pv, 3rv, 1lv, 45 m; stn 1182, 3pv, 1rv, 48 m; stn 1189, 1pv, 1lv, 20 m; stn 1190, 2rv, 2lv, 40 m; stn 1191, 1lv, 1rv; stn 1196, 4pv, 5lv, 4rv, 30 m; stn 1197, 1rv; stn 1198, 1pv, 42 m; stn 1205, 1pv, 38 m; stn 1217, 1pv, 2rv, 30 m). BANC CAPEL (Musorstom 5: stn DW264, 1rv). Ride des Loyaute: (Musorstom 6: stn DW430, 3pv, 2rv, 3lv, 30 m; stn DW431, 1pv, 21 m; stn DW434, 3pv, 1rv, 2lv, 23 m; stn DW435, 15pv, 3rv, 7lv, 32 m; stn DW436, 3pv, 1rv, 3lv, 33 m; stn 437, 3rv).

Remarks: Prashad (1932) outlined the taxonomic problems associated with this species. *Lioconcha ornata* has been confused in the literature by various authors. The typical *ornata*, as figured by recent authors (Abbott and Dance, 1982 [as *L. ornata* Lamarck, 1817]; Oliver, 1992; Lamprell and Whitehead, 1992), is attenuate posteriorly with an extended posterior margin and widely rounded ventral margin. However it should be noted that the species displays great inter-population variation in shape, convexity and colour pattern. The name *Lioconcha picta* (Lamarck, 1818) has also been used by some authors for this species. Lamarck (1818) described *L. picta* from the same illustrations as Dillwyn's *ornata* (Lister Conchylorum t.259. f.95 and Chemnitz Conchylien. 6. t.35. f.373, 376 and 381) and the latter name has priority. *L. ornata* (Lamarck, 1818) is a synonym of *L. castrensis* (Linnaeus, 1758).

Lioconcha (Sulcilioconcha) philippinarum (Hanley, 1844)

(Figure 2g-h)

Cytherea philippinarum Hanley, 1844: 110; Hanley, 1856: t.15, f.36.

Diagnosis: Shell solid, length to 27.7 mm. Sculpture of strong rounded, concentric ridges. Colour brown, with darker brown radial rays extending from the umbones; interior white.

Material examined: Nouvelle-Caledonie: Baie de St vincent (Lagon: stn 186, 1lv); Secteur de Canala (Lagon: stn 703, 1pv, 40 m); Grand Recif Mengalia (Lagon: stn 839, 2pv, 1lv, 37 m; stn 849, 1pv, 1lv, 1rv, 41 m); Secteur des Belep (Lagon: stn 1213, 1pv, 1rv, 32 m).

Remarks: The relatively few records of this species among this New Caledonian material appears to represent the southern limits of its range which extends through the Philippines to Japan.

Lioconcha (Sulcilioconcha) melhartae sp. nov.

(Figure 3a-c)

Etymology: Named for Dr Mel Harte in honour of her work on the Veneridae.

Diagnosis: Shell to 21 mm in length, 18.5 mm in height and 14.7 mm in width (paired valves); trigonally ovate, equivalve, inequilateral. Umbones situated anteriorly, moderately inflated and solid, oblique, prosogyrate. Lunule widely cordate, surrounded by an impressed line. Escutcheon long, narrow, impressed. Antero-dorsal margin short, steeply sloping, widely rounded terminally at the antero-ventral margin; postero-dorsal margin moderately convex, sharply sloping, broadly angulate posteriorly; ventral margin widely convex, slightly concave posteriorly. Shell with an ill-defined posterior fold extending from the umbones to the postero-ventral margin, with sculpture of dense

(approx. 80) flattened, concentric ribs which anastomose laterally and with irregular growth pauses; interstices between ribs very narrow, moderately deep. Periostracum white, thick and mostly confined to the margins. Hinge of left valve with anterior lateral tooth round and raised; anterior cardinal narrow, oblique and joined to median cardinal; median cardinal thick, moderately raised; posterior cardinal oblique, narrow; cardinal pit deep; inner margin ridged. Hinge of right valve with deep anterior lateral tooth pit; anterior cardinal narrow, raised, separated from the lower edge of the hinge plate, joined to median tooth at dorsal side of hinge plate; median cardinal narrow, peg-like; posterior cardinal bifid, oblique. Adductor muscle scars and pallial line poorly defined. External colour white, with blue-white growth pauses, usually with an orange ray extending from the umbones to the postero-ventral margin and an orange escutcheon and lunule. White specimens also occur often with tan-coloured zig-zag patterns. Internally the valves are glossy white with blue-white growth pauses showing through the shell surface.

Material examined: Holotype: MNHN – Nouvelle-Caledonie: Grand Recif Sud (Lagon: 1pv, stn 361, 22°36'S, 167°02'E, 29 Nov 1984, 78m). Length (anterior to posterior margin) 20.7mm, height (umbo to ventral margin) 18.3mm, width of conjoined valves 14.5mm.

Paratypes: MNHN – Nouvelle-Caledonie: Grand Recif Sud (Lagon: AM C305574, 3pv, stn 361, 22°36'S, 167°02'E, 29 Nov 1984, 78m; 1pv, 3lv, 1rv, stn 370, 22°38'S, 167°06'E, 30 Nov 1984, 127m; Lagon: 2pv, 2rv, stn 397, 22°39'S, 167°11'E, 23 Jan 1985, 125m; 1pv, 1lv, 1rv, stn 429, 22°40'S, 167°15'E, 25 Jan 1985, 95m); Sud Nouvelle-Caledonie (Lagon SMIB: 6pv, 2rv, stn DW81, 22°38'S, 167°35'E, 9 Sept 1989, 110m); Lagon Nord (Lagon: 1pv, stn 484, 19°00'S, 163°35'E, 2 Mar 1985, 35m; 5pv, stn 517, 19°09'S, 163°35'E, 5 Mar 1985, 42m; 1pv, stn 522, 19°08'S, 168°38'E, 5 Mar 1985, 42m).

Other material examined: Plateau Chesterfield-Bellona (Chalcal 1: stn D14, 2rv, 1lv; stn 55, 1lv; stn 57, 1lv). Nouvelle-Caledonie: Grand Recif Sud (Lagon: stn 320, 2pv, 1rv, 1lv, 70 m; stn 367, 1lv; stn 368, 1lv; stn 369, 1lv; stn 370, 1pv, 3lv, 1rv, 127 m; stn 386, 1lv; stn 417, 1rv; stn 429, 1rv); Lagon Nord (Lagon: stn 484, 1pv, 35 m; stn 486, 1pv, 33 m; stn 531, 1pv, 1rv, 56 m); Secteur de Poindimie (Lagon: stn 772, 1pv, 1lv, 30 m); Secteur des Belep (Lagon: stn 1064, 1lv; stn 1099, 1lv; stn 1103, 3pv, 1lv, 1rv, 32 m; stn 1117, 7pv, 1lv, 36 m; stn 1129, 9pv, 1lv, 1rv, 40 m; stn 1168, 1lv; stn 1205, 1pv, 38 m).

Remarks: Compared with *Lioconcha philippinarum* (Hanley) and *L. dautzenbergi* (Prashad), *L. melhartae* sp. nov. has a far greater number of concentric, flattened ridges with narrow interstices (rounded, wider in *L. philippinarum* and separated by deep furrow-like interstices; much wider, rounder in *L. dautzenbergi* and with narrow, shallow interstices). In addition *L. melhartae* is always white externally while *L. philippinarum* and *L. dautzenbergi* are predominantly brown with some white zigzag patterns; internally these latter species are coloured whereas *L. melhartae* is glossy white.

Lioconcha (Sulcilioconcha) richerdeforgesi sp. nov.

(Figures 3d–f; 4a–b)

Etymology: Named for Bertrand Richer de Forges who led the ORSTOM expeditions.

Diagnosis: Shell to 11.25mm in length, 9.4mm in height and 6.7mm in width (paired valves); ovate-equivalve, slightly inequilateral. Umbones situated anteriorly; moderately inflated, fragile, prosogyrate. Lunule narrowly cordate, raised centrally, surrounded by an impressed line; escutcheon short, lanceolate, impressed. Antero-dorsal margin short, widely rounded to the antero-ventral margin; postero-dorsal margin moderately convex, slightly sloping, broadly rounded posteriorly; ventral margin widely rounded. Shell sculptured with dense, flattened concentric ribs which anastomose laterally; interstices narrow, shallow. Periostracum white, thick. Hinge of left valve with

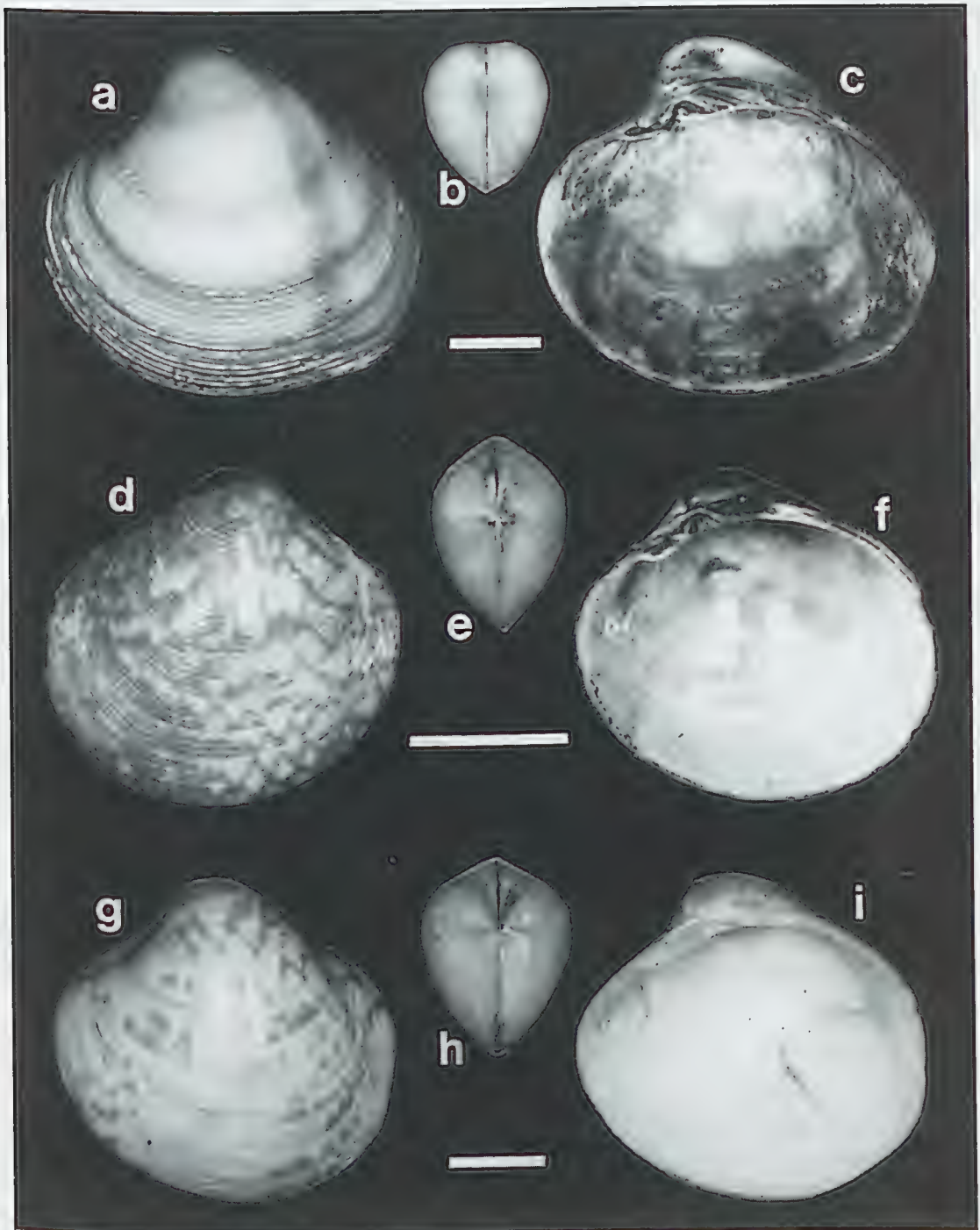


Figure 3. a-c. *Lioconcha (Sulcilioconcha) melhartae* sp.nov., holotype; d-f. *Lioconcha (S.) richerdeforgesi* sp.nov., Lagon; stn 876, paratype; g-i. *Pitar (Pitarina) healyi* sp.nov., holotype. Scale bars equal 5mm. Umbonal views not to scale.

anterior lateral tooth raised, peg-like; anterior cardinal oblique, thin, raised, joined to median cardinal towards the dorsal side of the hinge plate with a deep pit below their junction; median cardinal thick, raised, separated from the dorsal side of the hinge plate; posterior cardinal oblique, slightly curved, joined to dorsal side of hinge plate; inner margin ridged. Hinge of right valve with anterior lateral widely separated from the anterior cardinal (by lateral pit), anterior cardinal oblique, terminating at ventral edge of hinge plate, thin, raised, joined at dorsal side of hinge plate to median cardinal; median cardinal raised, slightly oblique, wider ventrally, separated from anterior and posterior cardinals by deep pits; posterior cardinal oblique, bifid, terminating short of ventral edge of hinge plate. Internal margins ridged, ridging stronger at the anterior and dorsal margins. Adductor muscle scars and pallial line poorly defined. Colouration: base colour white or tan with tan-brown or white v-shaped irregular markings over whole of shell surface; internally white with external colour patterns visible through the shell surface; escutcheon with tan-coloured chevron-shaped pattern crossing both valves.

Material examined: Holotype: MNHN – Nouvelle-Caledonie: Secteur de Pouebo (Lagon: 1pv, stn 876, 30–70m, 20°35'S, 164°51'E, 30–70 m, 13 Jan 1987). Length (anterior to posterior margin) 9.05 mm, height (umbo to ventral margin) 8.15 mm, width of conjoined valves 5.9mm.

Paratypes: MNHN – Nouvelle-Caledonie: Secteur de Poindimie (Lagon: 9lv, 8rv, many juveniles, stn 830, 105–110m, 20°49'S, 165°19'E, 10 Jan 1987); Secteur de Pouebo (Lagon: AM C305575, 2pv, 1rv, 1lv, stn 876, 30–70m, 20°35'S, 164°51'E, 13 Jan 1987).

Other material: Plateau Chesterfield-Bellona: (Chalcal 1: stn D21, 1lv). Nouvelle Caledonie: Grand Recif Sud (Lagon: stn 324, 1rv); Secteur des Belep (Lagon: stn 1104, 1rv).

Remarks: *Lioconcha richerdeforgesi* sp. nov. is more ovate than *L. philippinarum*, *L. dautzenbergi* and *L. melharteeae*, and does not have the raised umbones of these species. *L. richerdeforgesi* is also more densely ribbed than *L. dautzenbergi* and *L. philippinarum* and lacks the strong brown colour of these species and the white colour with orange markings or with tan-coloured zigzag patterns of *L. melharteeae*. The v-shaped, tan-coloured markings of *L. richerdeforgesi* readily separate it from the other species of *Lioconcha* (*Sulcilioconcha*) discussed here. Compared with *L. melharteeae* (which it most closely resembles), *L. richerdeforgesi* has more numerous ribs, is less inflated, has the lunule noticeably narrower, the anterior margin more widely rounded and lacks an angulated posterior.

Pitar (*Pitarina*) *citrina* (Lamarck, 1818)

(Figure 4c–d)

Cytherea citrina Lamarck, 1818: 306.

Dione citrina Reeve, 1863: pl.10, fig.43.

Pitar (*Pitarina*) *citrinus* Lamprell and Whitehead, 1992: sp.520.

Dione ustulata Reeve, 1863: pl.11, fig.49.

Diagnosis: Shell solid, inflated, subtrigonal, length to 40 mm. Sculpture of fine concentric lirae. Colour orange, yellow or sometimes white, with purple posteriorly; interior white or purple, sometimes rayed posteriorly.

Material examined: Nouvelle-Caledonia: Nouméa (Pte aux longs cous, 3pv, J.Vidal; Platier Ouen Toro, 4lv, J.Vidal; Presqu'île Nou, Anse Kuendu, 2pv, J.Vidal).

Remarks: *Pitar citrina* is widely distributed throughout the Indo-Pacific, it is a shallow-water species which was not represented in the expedition material but was donated to the MNHN from the J.Vidal collection.

Pitar (Pitarina) healyi sp. nov.

(Figure 3g-i)

Etymology: Named for Dr John Healy in honour of his contribution to Australian malacology.

Diagnosis: Shell to 17.15mm in length, 15.70mm in height and 10.85mm in width (paired valves); trigonally ovate, equivalve, almost equilateral, the umbones situated slightly anterior of the centre of the shell; inflated umbonally, moderately solid; umbones slightly oblique, curved forward; lunule large, cordate, raised centrally, striate, surrounded by an impressed line extending from under the umbones to the termination of the antero-dorsal margin; escutcheon not defined; antero-dorsal margin short, slightly convex, sharply sloping, rounded terminally; postero-dorsal margin slightly convex, sharply sloping, broadly angulate posteriorly; ventral margin widely convex; with an ill-defined postero-umbonal fold in each valve. Shell smooth, glossy with concentric microscopic striae and irregular growth lines; periostracum thin. Hinge of left valve with anterior lateral tooth strong, peg-like; anterior cardinal thin, acline, joined to median cardinal forming an inverted v-shaped socket; median cardinal solid, thick, oblique; posterior cardinal free, thin, oblique, parallel to ligament. Hinge of right valve with low anterior lateral tooth and deep socket to accommodate lateral tooth of left valve; anterior cardinal peg-like, narrow; median cardinal solid peg-like, wholly free; posterior cardinal oblique, long, slightly bifid. Adductor muscle scars and pallial line poorly defined, anterior adductor scar tear-shaped. Pallial sinus moderately shallow, wide, rounded terminally. External colour white, unpatterned or with interrupted orange-coloured zigzag patterns over the shell surface, umbones tinged with orange; periostracum chalky-white; interior white.

Material examined: Holotype: MNHN – Nouvelle-Caledonie: Secteur de Noumea (Lagon: 1pv, stn 29, 22°17'S, 166°34'E, 24m, 23 Mar 1984). Length 17.15mm, height 15.70mm, width (paired valves) 10.85mm.

Paratypes: MNHN – Plateau Chesterfield-Bellona (Chalcal 1: 1lv 2pv, stn D20, 19°11.60'S, 158°42.10'E, 67m). Nouvelle-Caledonie: Ile Ouen-Baie du Prony (Lagon: 1rv, stn 239, 22°24'S, 166°58'E, 43m, 23 Oct 1984); Grand Recif Sud (Lagon: AM C305576, 3pv, stn 315, 22°37'S, 166°53'E, 27 Nov 1984, 50m); Secteur de Yate (Lagon: 1rv, stn 619, 166°54'E, 22°03'S, 27–42m; 1pv, 2lv, stn 623, 22°01'S, 166°51'E, 6 Aug 1986, 32–40m; 1pv, stn 644, 21°52'S, 166°41'E, 48–45m); Secteur de Thio (Lagon: 3pv, stn 662, 21°44'S, 166°32'E, 8 Aug 1986, 50m; 3pv, 1lv, stn 664, 21°44'S, 166°29'E, 8 Aug 1986, 28–30m); Secteur de Poindimie (Lagon: 1lv, stn 808, 20°57'S, 165°30'E, 10 Jan 1987, 30m).

Other material examined: Plateau des Chesterfield: (Corail 2: stn DW63, 1rv, 1lv; stn DW107, 1rv; stn DW109, 1lv; stn DW115, 1lv; stn DW120, 1pv, 1rv, 325 m; stn DW157, 1lv); Plateau Chesterfield-Bellona (Chalcal 1: stn CP7, 1rv; stn D11, 1pv, 83 m; stn D22, 1lv, 68 m; stn D23, 1rv; stn D27, 2rv, 1lv, 67 m; stn D40, 1rv; stn D58, 1pv, 56 m; stn D60, 1pv, 45 m; stn 62, 1lv). Bancs Lansdowne-Fairway: (Corail 2: stn DW24, 1pv, 74–75 m; stn DW27, 1rv, 1lv; stn DW28, 1pv, 1lv, 78 m. Chalcal 1: stn D11, 1pv, 83 m; stn D62, 1lv). Nouvelle-Caledonie: Ile Ouen-Baie du Prony (Lagon: stn 69, 8pv, 13 m; stn 86, 1pv, 29 m; stn 92, 1pv, 24 m; stn 105, 1rv; stn 113, 6pv, 32 m; stn 120, 3rv, 1lv; stn 131, 1pv, 38 m; stn 146, 4pv, 40–52 m; stn 234, 7pv, 56 m); Secteur de Noumea (Lagon: stn 270, 1pv, 25 m); Grand Recif Sud (Lagon: stn 301, 6pv, 46 m; stn 314, 3pv, 46 m; stn 331, 1lv; stn 335, 3pv, 47 m; stn 349, 1pv, 55 m; stn 376, 2pv, 75–76 m; stn 403, 2pv, 45 m; stn 428, 1pv, 56 m; stn 567, 1pv, 51 m; stn 572, 2pv, 65 m); Lagon Nord (Lagon: stn 505, 1rv, 53 m; stn 509, 1pv, 49 m; stn 517, 1lv; stn 525, 1rv; stn 526, 1pv, 54 m; stn 528, 1lv; stn 529, 1pv, 50 m; stn 530, 2rv, 2lv; stn 533, 1pv, 1lv, 50 m; stn 534, 2pv, 1rv, 48 m; stn 542, 1pv, 50 m); Secteur de Yate (Lagon: stn 603, 1pv, 78–80 m; stn 614, 1pv, 48–50 m; stn 618, 1pv, 53–58 m; stn 640, 1lv; Secteur de Thio (Lagon: stn 652, 1lv; stn 662, 1pv, 50 m; stn 665, 1rv; stn 687, 1pv, 37–40 m; stn 692, 1pv, 33–38 m; stn 695, 1pv, 54–55 m); Secteur de Canala (Lagon: stn 723, 1rv; stn 727, 1pv, 45–46 m; stn 728, 1pv, 43–47 m); Secteur de Poindimie (Lagon: stn 801, 1pv, 29 m; stn 830, 42lv,

36 rv); Grand Recif Mengalia (Lagon: stn 847, 2pv, 28 m; stn 853, 1rv); Secteur de Pouebo; Lagon: stn 880, 3pv, 30–52 m); Secteur de Poum (Lagon: stn 995, 2pv, 36 m; stn 1022, 1pv, 25 m; stn 1023, 5pv, 27 m; stn 1025, 3pv, 28 m; stn 1028, 1rv); Secteur des Belep (Lagon: stn 1064, 4pv, 2lv, 29 m; stn 1065, 1pv, 3lv, 2rv, 28 m; stn 1067, 2pv, 28 m; stn 1070, 3pv, 1lv, 29 m; stn 1076, 3pv, 1lv, 31 m; stn 1077, 1rv; stn 1078, 1pv, 3rv, 4lv, 31 m; stn 1079, 2pv, 2lv, 1rv, 31 m; stn 1080, 5pv, 34 m; stn 1082, 1pv, 2lv, 3rv, 34 m; stn 1083, 1pv, 5lv, 8rv, 34 m; stn 1084, 5lv, 2rv; stn 1085, 11pv, 4lv, 3rv, 33 m; stn 1086, 7pv, 6rv, 1lv, 31 m; stn 1089, 12pv, 6rv, 6lv, 35 m; stn 1090, 11pv, 4lv, 4rv, 37 m; stn 1091, 11pv, 4rv, 3lv, 38 m; stn 1092, 4lv, 2rv, 37 m; stn 1093, 1lv; stn 1096, 9pv, 3lv, 1rv, 27 m; stn 1098, 4rv, 1lv; stn 1099, 6pv, 1rv, 38 m; stn 1101, 14pv, 39 m; stn 1102, 17pv, 6lv, 5rv, 38 m; stn 1103, 1pv, 32 m; stn 1107, 11pv, 41 m; stn 1108, 8pv, 1rv, 40 m; stn 1109, 5pv, 38 m; stn 1110, 3pv, 1lv, 31 m; stn 1112, 20pv, 42 m; stn 1113, 14pv, 1lv, 44 m; stn 1114, 24pv, 43 m; stn 1115, 1pv, 42 m; stn 1120, 6pv, 1rv, 47 m; stn 1121, 3pv, 1rv, 46 m; stn 1122, 14pv, 36 m; stn 1123, 8pv, 36 m; stn 1125, 13pv, 46 m; stn 1126, 1pv, 41 m; stn 1128, 3pv, 2rv, 26 m; stn 1130, 17pv, 53 m; stn 1131, 1pv, 53 m; stn 1132, 1lv; stn 1134, 5pv, 1rv, 40 m; stn 1137, 6pv, 51 m; stn 1136, 2pv, 50 m; stn 1138, 1pv, 42 m; stn 1141, 15pv, 1lv, 1rv, 53 m; stn 1142, 2pv, 54 m; stn 1143, 1lv, 1rv, 54 m; stn 1144, 8pv, 1lv, 2rv, 49 m; stn 1145, 1lv; stn 1157, 1pv, 48 m; stn 1160, 1pv, 65 m; stn 1162, 1pv, 1lv, 62 m; stn 1163, 6rv; stn 1164, 2rv; stn 1165, 1lv; stn 1166, 3pv, 63 m; stn 1167, 6pv, 5rv, 65 m; stn 1168; 2pv, 2rv, 50 m; stn 1170, 1rv, 1lv; stn 1171, 6lv, 3rv; stn 1172, 2lv; stn 1173, 2pv, 2lv, 2rv, 64 m; stn 1174, 6pv, 1lv, 53 m; stn 1175, 2pv, 1lv, 1rv, 62 m; stn 1176, 1lv; stn 1179, 1pv, 62 m; stn 1181, 1pv, 45 m; stn 1183, 6pv, 58 m; stn 1184, 1pv, 60 m; stn 1187, 6pv, 51 m; stn 1188, 22pv, 1rv, 33 m; stn 1189, 1pv, 20 m; stn 1190, 5pv, 1lv, 40 m; stn 1191, 13pv, 45 m; stn 1192, 5pv, 45 m; stn 1193, 3pv, 52 m; stn 1194, 4pv, 57 m; stn 1196, 1pv, 30 m; stn 1199, 3pv, 43 m; stn 1206, 1pv, 36 m; stn 1200, 3pv, 41 m; stn 1201, 18pv, 33 m; stn 1205, 2pv, 38 m; stn 1211, 2pv, 35 m; stn 1214, 1pv, 29 m); Sud Nouvelle-Caledonie (Lagon: stn 48, 6pv, 9rv, 8lv, 28 m).

Remarks: *Pitar healyi* sp. nov. is consistent in shape but variable in colour, ranging from pure, glossy white to being strongly patterned with orange or orange-brown zigzag patterns. It is most similar to *P. nancyae* Lamprell and Whitehead (1990) and *P. sophiae* (Angas, 1877) with which it occurs sympatrically. *P. healyi* differs from those species in being much more inflated, higher in proportion to length and less elongate. *P. healyi* is also similar in shape to *P. nipponica* Kuroda and Habe, 1971 and *P. japonicus* Kuroda and Kawamoto, 1956 but is smaller, more angulate posteriorly and has an umbonal-postero fold which is absent in those species.

Pitar (Pitarina) pellucidus (Lamarck, 1818)

(Figure 4e–f)

Cytherea pellucidus Lamarck, 1818: 313.

Dione australica Reeve, 1863: pl.11, fig.47.

Pitar (Pitarina) pellucidus (Lamarck); Lamprell and Whitehead, 1992: sp.516.

Diagnosis: Shell thin, length to 45 mm; similar to *P. affinis*, but much thinner and more inflated; the umbones are often tinged light brown with a purple spot beneath them.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW100, 1rv; stn DW112, 1pv, 58 m; stn DW164, 1lv). Nouvelle-Caledonie: Ile Ouen-Baie du Prony (Lagon: stn 63, 2pv, 20 m. Lagon: stn 243, 1pv, 29 m); Secteur de Noumea (Lagon: stn 275, 1pv, 19 m; stn 281, 3pv, 10 m); Grand Recif Sud (Lagon: stn 562, 1rv); Atoll de Surprise (Lagon: stn 457, 1pv, 38 m); Secteur de Yate (Lagon: stn 625, 1pv, 34–40 m; stn 641, 1rv); Secteur de Poindimie (Lagon: stn 781, 1lv; Grand Recif Mengalia stn 853, 1pv, 27 m; stn 873, 1lv).

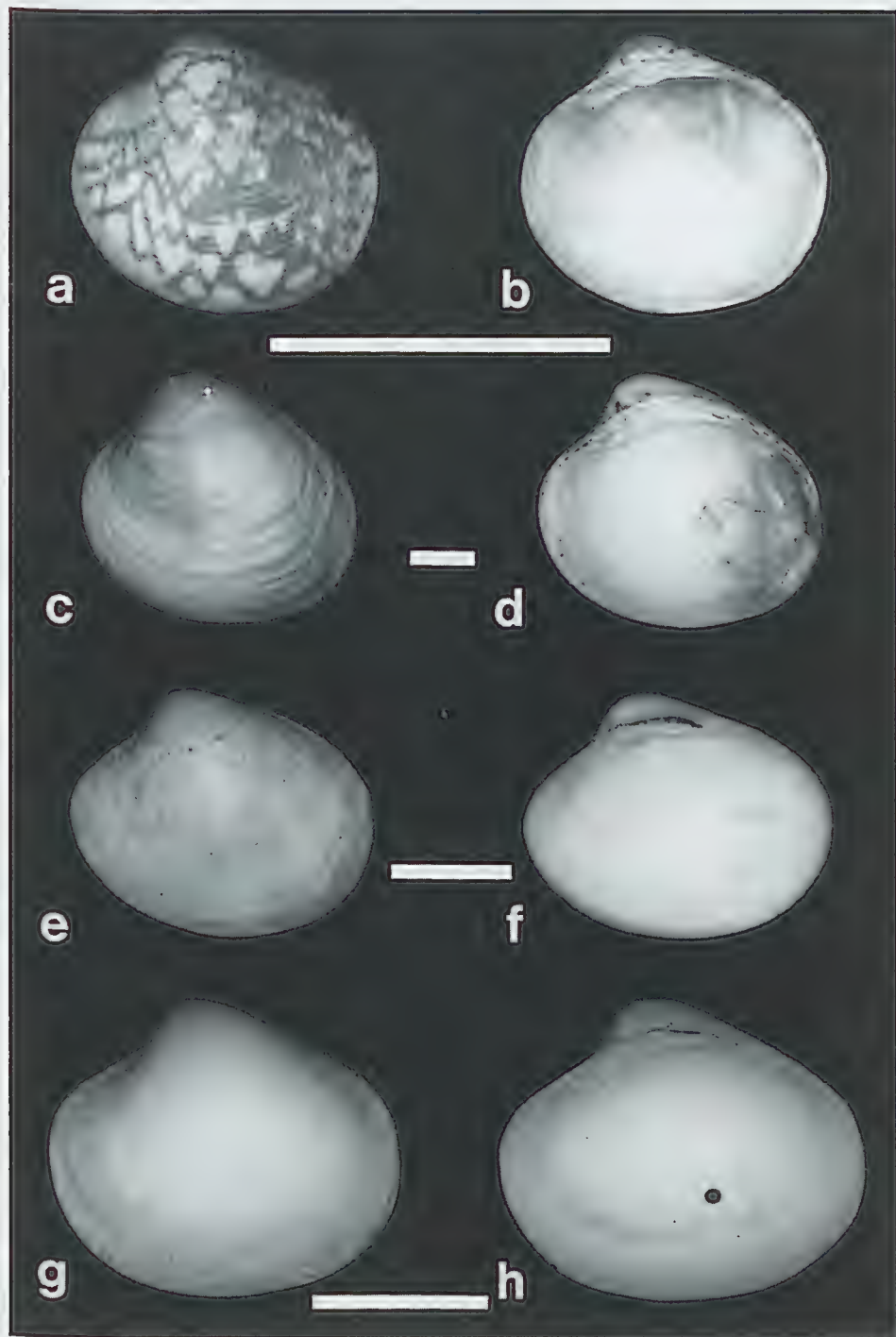


Figure 4. a-b. *Lioconcha (Sulcilioconcha) richerdeforgesi* sp. nov., holotype; c-d. *Pitar (Pitarina) citrina* (Lamarck), Noumea, J. Vidal; e-f. *Pitar (P.) pellucidus* (Lamarck), Lagon: stn 853; g-h. *Pitar (P.) noguchii* Habe, Lagon: stn 495. Scale bars equal 10mm.

Remarks: *Pitar pellucidus* is very variable in shape and colour, ranging from pure white to cream, usually with tan-coloured zigzag patterning, while the umbones are usually tinged with brown with a purple spot ventral to them. This is a widespread Indo-West Pacific, shallow-water species which has a relatively poor representation in the expedition material.

Pitar (Pitarina) noguchii Habe, 1958

(Figure 4g-h)

Pitar (Agriopoma) noguchii Habe, 1958: 34.

Pitar (Pitarina) noguchii Habe; Habe, 1964: pl.58, fig.6.

Diagnosis: Shell thin, inflated, length to 20 mm. Sculpture of fine concentric ridges and irregular growth pauses, with small puncture marks over surface. Colour white internally and externally. Similar to *nipponica* but differs in having a truncate posterior margin and in being more inflated.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW112, 1pv, 225 m). Bancs Lansdowne-Fairway: (Corail 2: stn DW21, 2pv, 1lv, 77 m; stn DW28, 1lv). Nouvelle-Caledonie: Grand Recif Sud (Lagon: stn 375, 1pv, 67-71 m); Atoll de Huon (Lagon: stn 439, 3lv, 2rv); Secteur de Thio (Lagon: stn 667, 1pv, 33-37 m); Secteur de Canala (Lagon: stn 698, 1pv, 43 m; stn 711, 1pv, 56 m; stn 749, 1pv, 49 m; stn 760, 1pv, 43 m); Secteur de Poindimie (Lagon: stn 763, 1pv, 42 m; stn 771, 1pv, 34 m; stn 773, 1pv, 1rv, 1lv, 48 m; stn 779, 1rv, 1lv; stn 780, 1pv, 33 m; stn 786, 1rv, 1lv; stn 795, 1pv, 31 m; stn 814, 1lv; stn 820, 1rv; stn 824, 1pv, 1lv, 30 m; stn 833, 2pv; stn 836, 1pv); Grand Recif Mengalia (Lagon: stn 840, 2rv, 2lv; stn 855, 1pv, 22 m; stn 856, 1pv, 30 m); Secteur de Pouebo (Lagon: stn 882, 1pv, 30-40 m); Secteur des Belep (Lagon: stn 1156, 1lv).

Remarks: Hitherto only recorded from Japan; these records are a significant range extension for the species.

Pitar (Pitarina) affinis (Gmelin, 1791)

(Figure 5a-b)

Venus affinis Gmelin, 1791: 3278.

Cytherea inflata Sowerby, 1853: 637, fig.89; pl.133, figs 127-128.

Pitar (Pitarina) affinis (Gmelin); Lamprell and Whitehead, 1992: sp.514.

Diagnosis: Shell solid, length to 50 mm. Sculpture of very fine growth pauses, glossy. Colour white or cream with tan-brown blotches and rays centrally and towards the umbones, purple spots sometimes beneath umbones; sometimes markings are absent; interior cream.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW121, 1pv, 1lv, 34 m). Nouvelle-Caledonie: Baie de St vincent (Lagon: stn 166, 1pv, 10 m); Atoll de Surprise (Lagon: stn 469, 1pv, 39 m); Secteur de Pouebo (Lagon: stn 900, 1pv, 40 m); Secteur de Koumac (Lagon: stn 921, 1rv); Secteur de Poum (Lagon: stn 972, 1lv, 1rv); Secteur des Belep (Lagon: stn 1069, 1lv; stn 1105, 1pv, 1lv, 25 m; stn 1196, 1rv; stn 1213, 1rv). Ride des Loyaute: (Musorstom 6: stn DW433, 1rv; stn DW436, 1rv).

Remarks: *Pitar affinis* is a common species in the Philippines and northern Australia. These records are an eastward extension of its range.

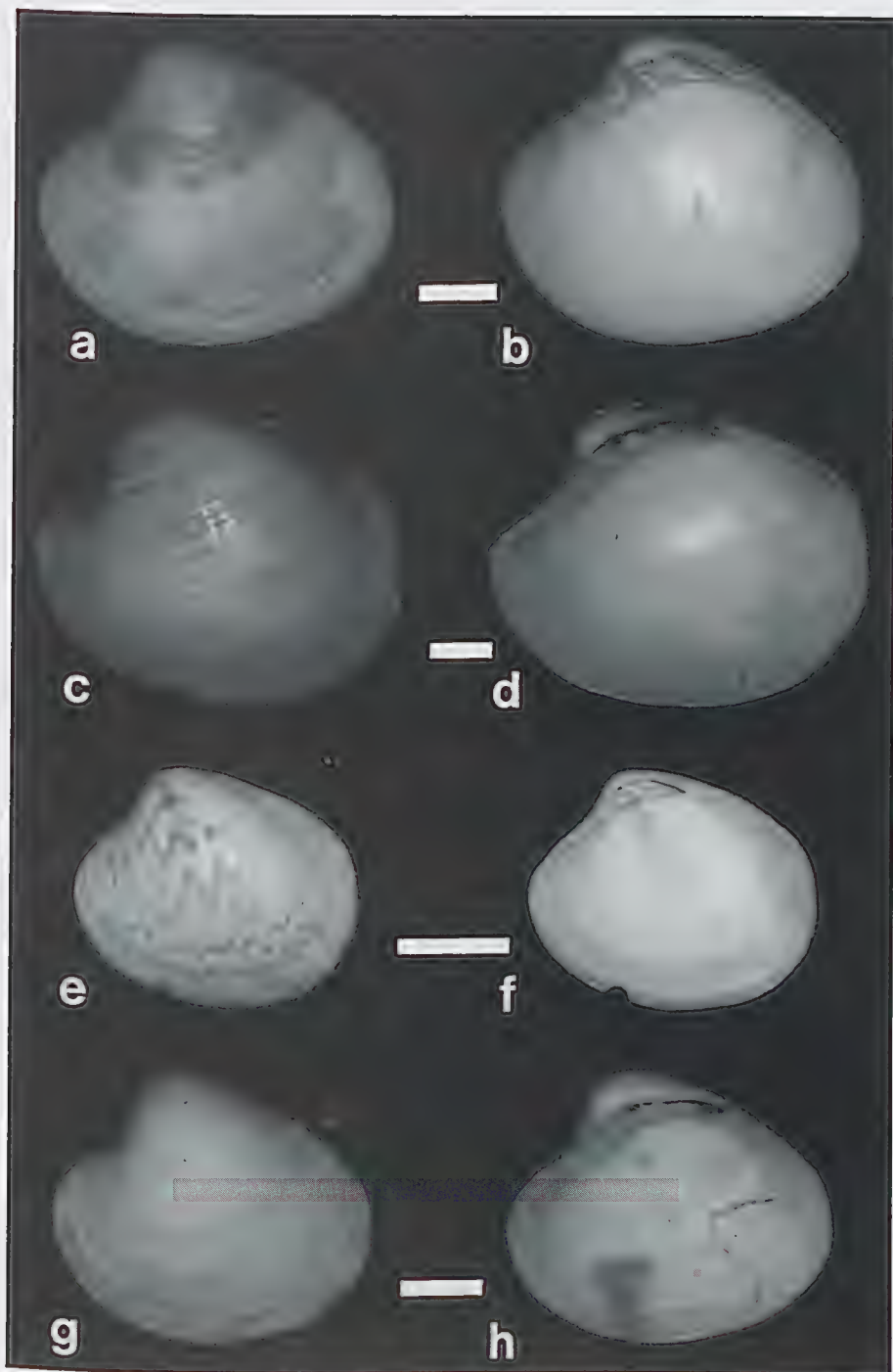


Figure 5. a-b. *Pitar (Pitarina) affinis* (Gmelin), Lagon: stn 469; c-d. *Pitar (P.) prora* (Conrad), Noumea, J. Vidal; e-f. *Pitar (P.) spoori* Lamprell and Whitehead, Corail 2: stn DW94; g-h. *Pitar (P.) japonicum* Kuroda and Kawamoto, Corail 2: stn DW21. Scale bars equal 10 mm.

Pitar (Pitarina) prora (Conrad, 1837)

(Figure 5c-d)

Venus prora Conrad, 1837: 253, pl.19, fig.18.

Pitar (Pitarina) prora (Conrad); Lamprell and Whitehead, 1992: sp.513.

Diagnosis: Shell solid, length to 65 mm, lunule large. Sculpture of even, fine, concentric striae and growth lines. Colour white or cream, internally and externally; some smaller specimens have fine tan radial chevron patterns.

Material examined: Nouvelle-Caledonie: Secteur de Poindimie (Lagon: stn 762, 1pv, 1lv, 43 m; stn 834, 1pv, 58 m); Presqu'île Nou, Anse Kuendu, 22°14'S, 166°22'E, J.Vidal, October, 1989.

Remarks: *Pitar prora* is the species with the largest and heaviest shell in the subgenus *Pitarina*. *P. prora* appears to be an uncommon species throughout its range.

Pitar (Pitarina) spoori Lamprell and Whitehead, 1990

(Figure 5e-f)

Pitar (Pitarina) spoori Lamprell and Whitehead, 1990: 42, fig.3a-d; Lamprell and Whitehead, 1992: sp.519.

Diagnosis: Shell length to 35 mm; similar to *pellucidus* and *subpellucidus*, but more quadrate and with a different colour pattern. Colour of anterior white, with sparse interrupted brown radial rays; a wide brown radial ray covers the posterior; the escutcheon is marked by a few, spaced brown lines; a deep brown spot often occurs beneath the umbones.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW94, 2pv, 36-53 m). Nouvelle-Caledonie: Secteur de Yate (Lagon: stn 643, 1pv, 56-66 m); Secteur de Poindimie (Lagon: stn 835, 1pv, 1rv, 135-150 m); Secteur des Belep (Lagon: stn 1118, 1lv).

Remarks: These records include the first live-collected specimens of *Pitar spoori*. Previously, this species was only known from dead shells taken in the littoral zone of north Queensland (Lamprell and Whitehead 1990).

Pitar (Pitarina) japonicum Kuroda and Kawamoto, 1956

(Figure 5g-h)

Pitar (Agriopoma) japonicum Kuroda and Kawamoto, 1956: 89, figs1-4.

Pitar (Pitarina) japonicus (Kuroda and Kawamoto); Lamprell and Whitehead, 1992: sp.522.

Diagnosis: Shell thin, subtrigonal, length to 35 mm. Sculpture of fine concentric growth lines. Colour cream-white, with pale orange or pink umbones and interior.

Material examined: Plateau des Chesterfield: (Corail 2: stn DW60, 1rv). Bancs Lansdowne-Fairway: (Corail 2: stn DW20, 1lv; stn DW21, 2pv, 1lv, 86 m). Nouvelle-Caledonie: Lagon Nord (Lagon: stn 496, 1rv, 1lv).

Remarks: These New Caledonian records of *Pitar japonicus* mark the southern limit of its distribution which extends from Japan to northern Australia.

Pitar (Pitarina) nancyae Lamprell and Whitehead, 1990

(Figure 6a–b)

Pitar (Pitarina) nancyae Lamprell and Whitehead, 1990: 45; fig.3e–h; Lamprell and Whitehead, 1992: sp.526.

Diagnosis: Shell thin, length to 30 mm; similar to *affinis* but with a thinner shell, more elongate profile and darker colour markings. Colour white, with wide, broken rays of brown; lunule and escutcheon sparsely marked with brown zigzag pattern; umbones purple tipped; interior white, with a small, livid purple spot inside the umbones.

Material examined: Plateau Chesterfield-Bellona: (Chalcal 1: stn D56, 1pv, 60 m). Bancs Lansdowne-Fairway (Chalcal 1: stn CP1, 1lv). Nouvelle-Caledonie: Grand Recif Sud (Lagon: stn 548, 1pv, 33 m); Lagon Nord (Lagon: stn 542, 1rv); Secteur de Thio (Lagon: stn 668, 2pv, 1rv, 40 m); Secteur de Canala (Lagon: stn 702, 2pv, 37 m); Secteur de Poindimie (Lagon: stn 787, 1pv, 39 m; stn 836, 1pv, 57 m); Secteur de Pouebo (Lagon: stn 902, 1pv, 32 m).

Remarks: Previously recorded from the coasts of central to north Queensland, these records of *Pitar nancyae* represent a significant range extension. The species usually occurs in depths ranging from 20–30 m, however the specimens collected from this expedition ranged from 33–60 m.

Pitar (Pitarina) sophiae (Angas, 1877)

(Figure 6c–d)

Cytherea sophiae Angas, 1877: 176, pl.26, f.23.

Pitar (Pitarina) sophiae (Angas); Lamprell and Whitehead, 1992: sp.531.

Diagnosis: Shell thin, inflated, length to 17 mm. Sculpture of concentric growth lines, smooth, glossy. Colour white, with grey concentric bands, sometimes with faint brown broken rays; umbones usually tinged with red anteriorly, visible internally.

Material examined: Bancs Lansdowne-Fairway: (Corail 2: stn DW19, 1rv). Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 13, 1pv, 20 m); Ile Ouen-Baie du Prony (Lagon: stn 133, 1pv, 59–62 m; stn 146, 1pv, 40–52 m; stn 234, 5pv, 1lv, 56 m; stn 238, 1lv); Grand Recif Sud (Lagon: stn 429, 2rv); Secteur de Yate (Lagon: stn 606, 2pv, 1lv, 48 m; stn 608, 1rv; stn 621, 1rv); Secteur de Thio (Lagon: stn 650, 1lv; stn 676, 1pv, 41 m; stn 692, 2pv, 48 m); Secteur de Canala (Lagon: stn 696, 1rv; stn 716, 1rv; stn 726, 1pv, 51 m; stn 729, 1pv, 1lv, 45 m; stn 759, 1rv); Secteur de Poindimie (Lagon: stn 771, 1pv, 34 m; stn 780, 1rv; stn 801, 1pv, 29 m; stn 821, 2lv; stn 830, 2lv, 8rv; stn 835, 1rv); Grand Recif Mengalia (Lagon: stn 847, 2pv, 28 m; stn 865, 1rv).

Remarks: Smith (1885) considered *Pitar sophiae* to be a synonym of *Cytherea hebraea* Lamarck, 1818. However comparison of specimens of *P. sophiae* in the Australian Museum and the type of *P. hebraea* in the Museum National d'Histoire Naturelle, Geneve shows that *P. sophiae* is longer in proportion to height than *P. hebraea*, is more widely rounded at the anterior and posterior margins, does not attain the size of *P. hebraea*, has a pink flush on the inner side of the valves of many specimens and has a different colour pattern. Additionally, the pallial sinus in *P. hebraea* is wider, deeper and less ascending than in *P. sophiae*.

Pitar (Pitarina) potteri Healy and Lamprell, 1992

(Figure 6e–f)

Pitar (Pitarina) potteri Healy and Lamprell, 1992: 79; fig.1e–h; Lamprell and Whitehead, 1992: sp.515 (as *Pitar* sp.)

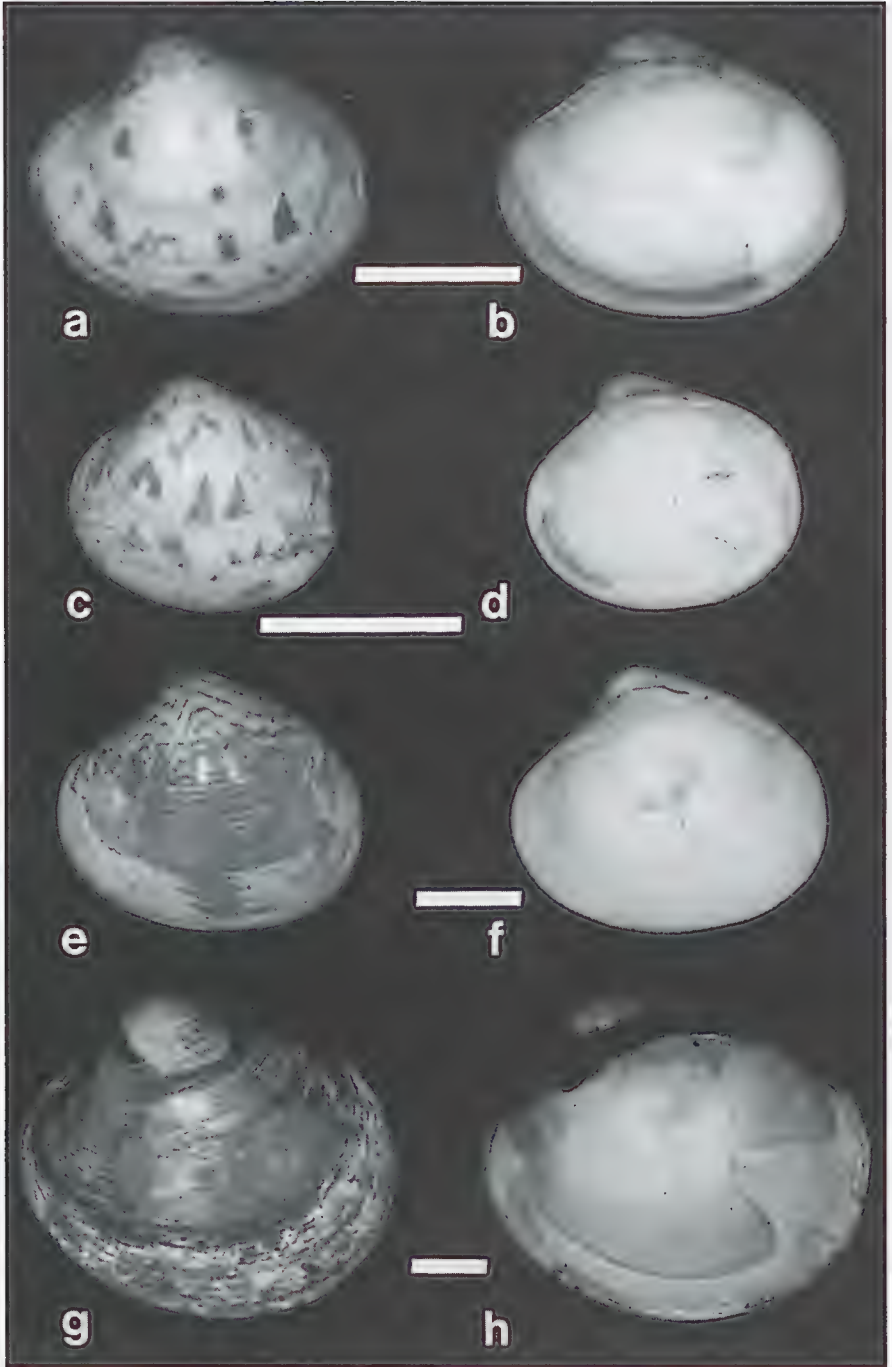


Figure 6. a-b. *Pitar (Pitarina) nancyae* Lamprell and Whitehead, Lagon: stn 702; c-d. *Pitar (P.) sophiae* (Angas). Lagon: stn 13; e-f. *Pitar (P.) potteri* Healy and Lamprell, Musorstom 6: stn DW432; g-h. *Pitar (Hyphantosoma) intricata* (Dautzenberg), Lagon: stn 28. Scale bars equal 10 mm.

Diagnosis: Shell solid, inflated, length to 38 mm; similar to *affinis*, but smaller and more inflated. Sculpture of microscopic concentric growth striae. Colour cream-white with faint tan zigzag patterns near umbones; interior white.

Material examined: Ride des Loyaute: (Musorstom 6: stn DW432, 1pv, 21 m; stn DW437, 1rv).

Remarks: *Pitar potteri* is another species hitherto known only from north Queensland waters.

Pitar (Hyphantosoma) intricata (Dautzenberg, 1907)

(Figure 6g-h)

Meretrix (Pitar) intricata Dautzenberg, 1907: 333, pl.v, fig.1.

Diagnosis: Shell solid, inflated, length to 53 mm; similar to *spoori*, but larger, more inflated with stronger concentric sculpture and less quadrate than that species. Sculpture of dense concentric ridges crossed by zigzag grooves, weaker medially. Colour light-brown to white externally, internally white.

Material examined: Nouvelle-Caledonie: Secteur de Noumea (Lagon: stn 28, 1pv, 9 m).

Remarks: *Pitar intricata* has hitherto only been recorded from the Celebes and Japan.

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